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Displaced femoral neck fractures in adult and elderly patients, pitfalls in treatment options: internal fixation or replacement?

Erişkin ve yaşlı hastalarda deplase femur boynu kırıkları, tedavi seçiminde yapılan hatalar. İnternal fiksasyon mu, replasman mı?

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The incidence of hip fractures is steadily increasing. The treatment of displaced femoral neck fractures is controversial. The principal area of disagreement is whether to reduce the fracture and use internal fixation or to perform a total or partial hip replacement. Especially in Scandinavia, primary osteosynthesis, irrespective of age, has been the method of choice for decades with an 80% success rate. Even the supporters of osteosynthesis report a high percentage of non-union (20-25%) mainly due to failures in the elderly. Undoubtedly, younger patients and those with minimally displaced fractures should be treated by internal fixation in an attempt to preserve the natural hip joint. Hemiarthroplasty appears to be best suited for the elderly. The 'gray-zone' in between the two distinct patient populations is the subject of much controversy.

Key words: Arthroplasty; femoral neck fractures/therapy/surgery; fracture fixation, internal/adverse effects; hip dislocation/surgery; hip prosthesis/methods; postoperative complications.

Kalça kırıklarının insidansı giderek artmaktadır. Deplase femur boynu kırıklarının tedavisinde tartışmalı noktalar vardır. Tartışmanın ana konusu, kırığı redükte edip internal fiksasyon uygulamak ya da total/parsiyel kalça replasmanı yapmak üzerinde yoğunlaşmaktadır. Özellikle İskandinav ülkelerinde, uzun yıllardır, yaştan bağımsız olarak primer osteosentez yaklaşımı benimsenmiştir ve başarı oranı %80'dir. Osteosentez savunucuları bile, esas olarak yaşlı hasta grubundaki başarısızlıklara bağlı olarak yüksek oranda non-union (%20-25) bildirmektedirler. Hiç kuşku yok ki, genç hastalar ve minimal deplase kırıkları olan kişiler, kalça eklemini koruyacak bir osteosentez ile tedavi edilmelidir. Yaşlılarda en uygun yolun hemiatroplasti olduğu görünmektedir. Bu iki farklı hasta grubu arasında kalanlardaki yaklaşım ise büyük tartışma yaratmaktadır.

Anahtar sözcükler: Artroplasti; femoral boyun kırıkları/tedavi/cerrahi; kırık fiksasyonu, internal/yan etkiler; kalça çıkığı/cerrahi; kalça protezi/yöntem; postoperatif komplikasyon.

The incidence of hip fractures is steadily increasing. The treatment of displaced fractures of the femoral neck is controversial. The principal area of disagreement is whether to reduce the fracture and use internal fixation, or to perform a total or partial hip replacement.[1] Especially in Scandinavia, primary osteosynthesis, irrespective of age, has been the method of choice for decades, with a success rate of 80 percent. Even the supporters of osteosynthesis report a high percentage of non-union (20-25%), mainly due to failures in the elderly. Reoperation rate after internal fixation is three times greater than that after hemiarthroplasty. A recent meta-analysis of 106 published reports on the outcome of femoral neck fractures found non-union and avascular necrosis rates as 33% and 16%, respectively, two years after primary

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internal fixation.[1] Undoubtedly, due to the consideration given to the preservation of the natural hip joint, younger patients and those with minimally displaced fractures should be treated by internal fixation.Hemiarthroplasty appears to be best suited for elderly household ambulators with limited activity expectations.[2] The "grey-zone" in between these two distinct patient populations is the subject of much controversy.

Based on their experience and a review of the literature the authors attempt to outline some guidelines to *(i)* optimize preoperative planning and timing, *(ii)* facilitate the choice between fixation and replacement, *(iii)* identify the patient in whom internal fixation is contraindicated, *(iv)* improve the quality of reduction and fixation, and *(v)* decrease the operative risk of cemented arthroplasty.

Timing and preoperative planning

Delayed admission to the hospital contributes to the preoperative prevalence of deep venous thrombosis (DVT).[3] Adequate fluid resuscitation and medical stabilisation prior to surgery are mandatory. Any delay in fracture treatment (>72 hrs) in elderly patients who are physiologically stable on admission increases morbidity, mortality and overall hospital cost.[4] One retrospective study showed a lower mortality rate throughout one year after operation in patients undergoing surgery within 12 hrs of admission.[5] On the other hand, the amount of analgesic drugs given to patients after a femoral neck fracture is often inadequate for the relief of perceived pain.[4]

Internal fixation

Displaced femoral neck fractures in elderly rheumatoid patients should be treated by (total) hip replacement.[6] Success in fixation largely depends on the degree of osteoporosis.[7] Above the age of 80, patients with minimally displaced or impacted intracapsular fractures are at high risk for failure of internal fixation.[8] A small head fragment, varus angulation of the head, the degree of fracture displacement, the amount of medial displacement between fragments (> 20 mm), comminution of the calcar, and a vertical fracture configuration, particularly in males, are radiographic portents of a disturbed healing before reduction (Fig. 1).[9-11] After reduction, a fixation in varus is an ominous sign.

How to minimize failures of internal fixation?

One should always keep in mind that a favorable outcome depends on the quality of reduction (Fig. 2). In the first instance, a closed reduction maneuver should be tried.[12] It is essential that the fixation screws have cortical support.[13] When necessary, an anterior capsulotomy should be attempted to release the intracapsular tamponade or a joint aspiration should be performed.[14] If attempts at closed reduction fails, a Watson-Jones open reduction is advisable. Large hip compression screws may cause damage to the blood supply.[15] Cannulated screws, Hansson pins or Uppsala screws should be placed parallel. Use of more than three implants should be avoided, so should superior screw placement. The screws are to be placed in

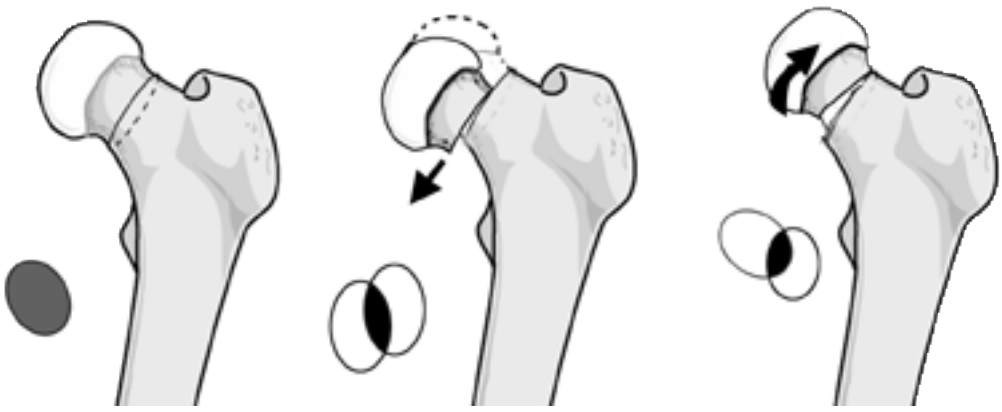

Figure 1. The significance of a rotational displacement and the importance of using an imaging intensifier to control the alignment are illustrated.

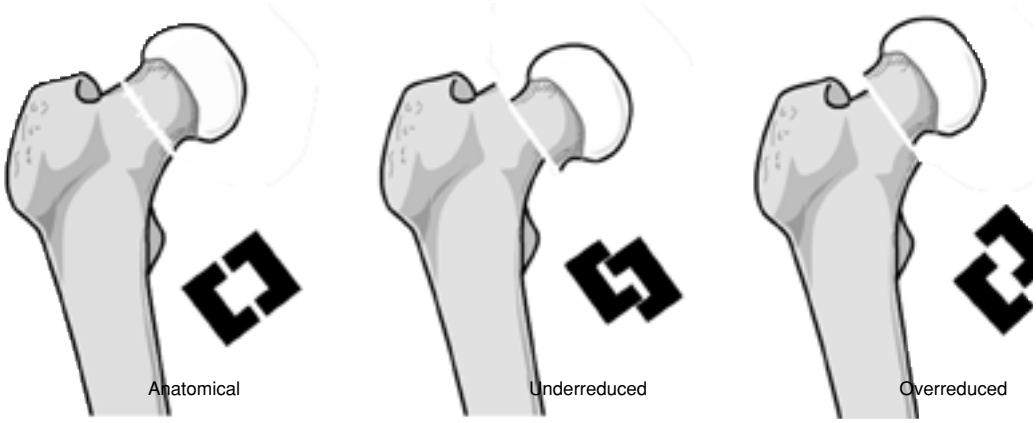

Figure 2. The quality of the reduction predicts the outcome, and a fixation in varus is an ominous sign.

the subchondral bone where bone quality is the best.[16] Unrecognized joint penetration is a true pitfall, and should be checked on anteroposterior, lateral and oblique radiographs.

Undisplaced intracapsular fractures: to fix or not?

Bentley[17] reported a 12% non-union rate in conservatively treated fractures. The operation is very simple and allows immediate mobilization. There is no significant morbidity. According to Raaymakers, healing of an impacted fracture is 70%, albeit no treatment at all (E. Raaymakers, SICOT 1996). Major risk factors for secondary displacement seem to be a poor general or mental condition and age over 70 years.

Prosthetic replacement

The decision of performing either fixation or replacement is based on the physiologic rather than the chronologic age of the patient. Use of a physiologic status score (PSS) is instrumental in selecting the most proper therapeutic strategy for patients between 65 and 85 years of age.,[18] which, in a series of 166 patients, reduced the incidence of fracture-related complications to 5%. Compared to internal fixation, primary arthroplasty has been associated with a slightly higher mortality rate at 30 days post-surgery.[18] According to Lu-Yao et al.,[1] these two procedures yield no difference beyond three months. Use of an expensive bipolar prosthesis is not justified in patients over 80 years of age.[19] Irrespective of age, bipolar prostheses are polyethylene wear machines, and their use should therefore be avoided in the very active patient. A cemented Thompson bipolar hemiarthroplasty gives a better clinical result than that of an uncemented Moore prosthesis.[20]

Preexisting osteoarthritis is an indication for total hip replacement. Patients with a high activity level and an anticipated life expectancy of more than five years are also candidates for hip replacement.[2] The results of hip replacement in neck fractures are comparable to those of primary total hip arthroplasty (THA), but are less satisfactory in the event of intertrochanteric fractures.[21] A total hip replacement provides better pain relief and better function. However, the risk of dislocation is high (10%) within the first years after surgery. Compared to a posterior one, an anterior operative approach was consistently associated with a lower mortality rate at two months.[1] Measures to prevent DVT should be considered during THA (such as intraoperative anticoagulation) rather than in the postoperative period.[22] Cemented arthroplasty, especially in the elderly, causes both more severe and prolonged embolic cascades than does uncemented arthroplasty.[23] Avoidance of compression of the marrow-filled distal femoral cavity by means of a plug results in effective prevention of circulatory reactions.[24] A thorough medullary lavage before cement insertion may help to reduce embolic phenomena and cardiopulmonary changes.[23]

Conclusions

Both arthroplasty and internal fixation can produce satisfactory results in older patients with acute displaced fractures of the femoral head. Use of a PSS can be helpful in deciding between fixation and arthroplasty. Internal fixation is a difficult operation

and can only be successful if proper attention is paid to all technical details. Modern anaesthesia techniques and improved femoral canal preparation may reduce the inherent risks of cemented arthroplasty.

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